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ABSTRACT

Many states have mandated two possibly far-reaching legislative reforms within secondary vocational education: minimum competency requirements and increased course requirements for graduation. Most legislated educational reforms include only selected aspects of competency-based systems, primarily the specification of and testing for minimum competencies in reading and mathematics. The minimum competency movement often becomes a testing movement because testing is the most immediate way for legislators to satisfy the public. A particular danger in testing is that its advocates may have two different understandings of its purpose--accountability versus effectiveness. Because more state tests focus on basic language and computational skills, they may affect instruction by narrowing the curriculum. The increase in required courses may deny students a vocational track because they have fewer electives. School personnel may not be given sufficient time to develop plans to substitute vocational courses for academic requirements. Both reforms involve the issue of what constitutes a proper education for today's technological society. Within business and industry, two apparently contradictory factions have emerged. One group emphasizes vocational education, career education, and basic skills; the other emphasizes a strengthened liberal arts curriculum. Both advocate, ultimately, specialized knowledge as well as employability skills. (YLB)

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Educating for the Future:
The Effects of Some Recent Legislation on Secondary Vocational Education

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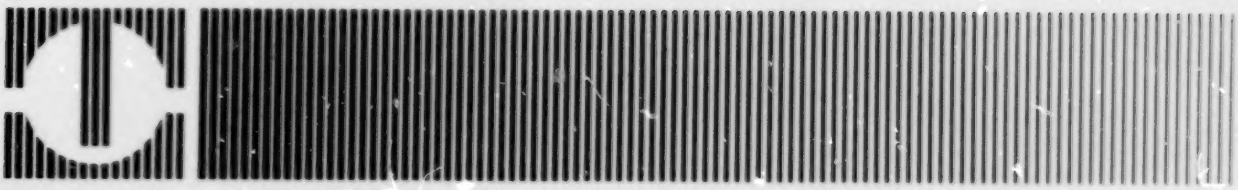

OFFICE FOR RESEARCH IN HIGH TECHNOLOGY EDUCATION
The University of Tennessee College of Education

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Educating for the Future: The Effects of Some Recent Legislation on Secondary Vocational Education

by

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FOREWORD

The Office for Research in High Technology Education at the University of Tennessee, Knoxville, is conducting a program of work on high technology and its implications for education. Funded by the U.S. Department of Education's Office of Vocational and Adult Education, the program addresses the skill requirements and social implications of a technology-oriented society. Issues concerning computer literacy and computer applications are a focus of the program. The balance between the liberal arts and technological skills and the complementary roles they play in enabling people to function in and derive satisfaction from today's high-technology era are also addressed. The program's efforts are targeted at secondary schools, two-year post-secondary institutions, community colleges, universities, industrial training personnel, and other education and training groups.

The program consists of three major components:

At Home In the Office Study - At Home In the Office is an experiment that has placed office workers and equipment in the workers' homes to determine (1) what types of office work can effectively be done at home and (2) the advantages and disadvantages of home work stations. The implications for educators, employers, and employees will be significant, as work at home offers a possible avenue of employment for people living in rural areas, parents of pre-school children, handicapped individuals, and others.

COMTASK Database - COMTASK is a model of a computerized task inventory for high-technology occupations. The outcomes of the COMTASK system include a sampling of task analyses, the demonstration of how these task analyses can be rapidly updated, a manual for conducting task analyses to provide data for the system, and a guide to using the system.

State-of-the-Art Papers - A series of nine papers is being developed to address high technology and economic issues that are of major concern to education. Nine working titles have been selected:

- The Changing Business Environment: Implications for Vocational Curricula
- Computer Literacy in Vocational Education: Perspectives and Directions
- Computer Software for Vocational Education: Development and Evaluation
- Educating for the Future: The Effects of Some Recent Legislation on Secondary Vocational Education
- The Electronic Cottage
- High Technology in Rural Settings
- (Re)Training Adults for New Office and Business Technologies
- Robots, Jobs, and Education
- Work in a World of High Technology: Problems and Prospects for Disadvantaged Workers

Abstract

This paper explores the issues involved in two types of legislative reforms within secondary education: minimum competencies and increased course requirements for graduation. In particular, the consequences of the reforms for vocational education are considered, and thus the paper includes the perspectives of business and industry leaders.

While competency-based education is a comprehensive teaching-learning system, the national minimum competency movement is more often a reading and mathematics testing movement. Some dangers in legislated competencies and tests are that they may be developed under pressure from the media, not from educators; may be insufficiently developed before implementation; may be decided upon without the consultation of all significant groups; and may narrow the schools' curriculum.

Considering the second reform, most increases occur in the traditional liberal arts requirements of English, mathematics, and science. Some dangers of this are that students may be denied a vocational track because they have fewer electives; that students will choose academic courses out of fear that they won't graduate; and that school personnel may not be given sufficient time to develop plans to substitute vocational courses for academic requirements.

Both reforms really involve the issue of what constitutes a proper education for today's technological society. Two seemingly contradictory viewpoints have emerged from business and industry leaders. One view emphasizes vocational education, career education, basic skills, and the use of microcomputers; the other emphasizes a strengthened liberal arts curriculum. However, this conflict may be more apparent than real, for when business and industry leaders advocate traditional academic studies, their actual proposals reveal something broader — something that includes specialized knowledge as well as employability skills.

In summation, what the future holds for secondary vocational education is a closer relationship with academic education. Teachers in both areas must work together to show those who legislate educational reforms that secondary education is not an either-or, single-track battle between liberal arts and practical studies. They must work together to show legislators that competency-based education is a complete system that must include program development as well as student evaluation and that must never allow minimum competencies to become maximum standards. They must work together to show legislators that students who so desire can learn academic skills in vocational courses. And they must work together with business and industry to ensure that increased graduation requirements, or a return to a rigorous academic curriculum, are designed so that students are better prepared, not less prepared, to enter our high-tech future.

About the Author

Margaret Ferqueron has worked closely with the Florida legislature on its recent changes in curriculum and graduation requirements. As past president of the National Research Coordinating Unit Association, she has linkages with all the states and a keen interest in the impact of legislation on vocational education across the country.

About the Editors

This paper has been prepared as part of a series of state-of-the-art papers edited by Lillian A. Clinard, an associate director of The University of Tennessee's Energy, Environment, and Resources Center (EERC), and Mary R. English, a research associate at EERC. The editors, who have been on assignment to the Office for Research in High Technology Education, were responsible for selecting the series' authors, reviewing and coordinating external reviews of the papers, and preparing the papers for release.

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INTRODUCTION

In the last few years, a great deal of public attention has been given to the shortcomings of American secondary education. Indeed, "shortcomings" is too mild a word for what many writers — members of national commissions as well as individual educators — have identified as a crisis. The best known report, of course, and one of the harshest, is A Nation at Risk (1983), prepared by the National Commission on Excellence in Education. Theodore Sizer's Horace's Compromise: The Dilemma of the American High School (1984) is another particularly condemning appraisal. Through these and other reports, we have been warned that the reading, writing, and computational skills of students in the eighties are declining, not improving. Leiterman (1983a) reports that American students consistently score lower on academic tests than do students from other industrialized nations and that since 1957 the average scores on the Scholastic Aptitude Test (SAT) have fallen 50 points in the verbal portion and 40 points in the math portion. Indeed, a study cited by Savoye (1983) suggests that public schools may actually stultify students' desire to learn rather than stimulate it: "Approximately 50 percent of students entering junior high schools say they like science, but only 25 percent feel that way when they leave junior high" (p. B-1). More broadly, beyond specific subject matter, critics charge that American students are becoming increasingly deficient in intellectual skills, which include, according to Martin (1980), "the uses and limitations of logic; the nature of comprehension, interpretation, and extrapolation; the application of knowledge to new situations; the analysis of elements, principles, and

relationships; the construction of a synthesis, a plan of operation; and the evaluation of evidence and conclusions through the use of internal and external criteria" (p. 284).

Deficiencies in reasoning powers and traditional academic studies are not the only indictments, however. Education for Tomorrow's Jobs (Sherman, 1983), prepared by the National Research Council, charges that many students graduate from high school with poor employability skills, work habits, and vocational skills.

Of course, such concentrated attention on the failures of America's schools has occasioned a counter response. The achievements of our educational system are also being brought into the public eye. One beneficial result of even the harshest criticism is simply that, across the nation, people are examining and talking about education. When, for example, a mass-circulation magazine such as Parade devotes a feature article to the state of American education, educators know that their profession is most certainly no longer being ignored (Michaels & Gavzer, 1984). In defense of today's schools, Michaels and Gavzer point out that comparisons with the schools of 20 or 30 years ago must take into account the great social changes that have occurred -- desegregation, for example, and the millions of refugees who have been absorbed into the U.S. educational system (pp. 4-5). They argue that these changes affect any standardized measure of graduates' achievement and that in fact SAT scores are rising after a 20-year decline -- primarily because minority students' scores have improved significantly. Another indication of the educational system's successful passage through these social adjustments is that, in

1950, 57.1 percent of white students and 25.7 percent of black students graduated from high school; today, the graduation rates are 85 percent and 77.5 percent, respectively.

Nevertheless, there is consensus that our schools can be, and need to be, better. Many remedies have been proposed and some acted on: increased funding for education, "master teacher" merit pay, required statewide student assessment tests, more stringent graduation requirements, a longer school day, tougher teacher education programs and recruitment of brighter students for the programs, more involvement of business and industry in education, and required competency exams for beginning teachers. State legislatures are taking action on education, and it is two of these legislative responses that this paper will focus on, particularly as they affect secondary vocational education: minimum competency requirements and increases in course requirements for graduation.

It should be noted that the effect on vocational education is not a subsidiary issue in these reforms, but a central one, for educational reform in a high-tech era raises questions about just what constitutes a "proper education" for a society that is being transformed by technology. The skills to be learned and the courses to be taught cannot be determined in isolation from the culture in which we live, and that culture is changing. The National Center for Educational Statistics (NCES) reported that, in 1981-82, most high school graduates (69%) did not go on to four-year colleges; of these young people, 45% received no postsecondary education and 23% enrolled in vocational technical schools or two-year colleges (Snyder, 1983, p. 56).

We must therefore carefully consider the world of work that high school graduates will face, and for that reason this paper will also examine the relationship of business and industry to education -- both what business and industry ask of education and what business and industry may do for education. The perspective of business people on minimum competencies and graduation requirements is a necessary element in any assessment of today's educational reforms. While this perspective is by no means unified, it does suggest, overall, that high school education must combine a solid base of general knowledge with practical, work-related instruction; the success of a reform must be judged against its effect in the reality of a high-tech world.

STATE LEGISLATION AFFECTING SECONDARY EDUCATION

Within the last five years, all 50 states have passed some type of legislation intended to improve secondary education (Leiterman, 1983b, 1983c, 1983d). Their initiatives have involved a variety of school components: administration and instruction, minimum competency testing, community and school partnerships, curriculum guidelines, program review, technical assistance, and course requirements for graduation. Of these, two of the most far-reaching -- and controversial -- are the mandation of minimum competencies and more stringent course requirements for graduation. They are controversial because they involve questions of educational philosophy, and they remain controversial because, at this writing, they have not yet resulted in sufficient data to judge their effectiveness empirically. (Often, indeed, legislatures mandate reforms but do not consider mandating a concomitant evaluation process. Action comes first, study is an afterthought.) They are far-reaching because, over time, they have the potential to cause profound changes in many other aspects of secondary schools: the emphases of the curriculum, the role and work-load of the teachers, the standards reflected in diplomas, the options available to students, the legal liability of a school that certifies students "competent" in specific areas.

Minimum Competency Requirements

Before presenting examples of competency-based reforms, a brief comparison of traditional and competency-based educational systems is needed. Traditional systems of instruction, grading, and promotion (those

through which most of us passed) are sometimes designated time-based in distinction to competency-based. The term is meant to illustrate that students' promotion or graduation is determined by the amount of time spent studying certain subjects (a 50-minute period, a semester, a 9-month school year). The fixed periods of time translate into credits. This system is also often called the Carnegie system because it was first defined by the Carnegie Foundation for the Advancement of Teaching in an attempt to standardize course credits based on the number of hours of instruction (Spady, 1978, p. 39). A unit of credit was to be given for a class which met for 120 clock hours throughout the school year (Oliver, 1974, p. 10). In the Carnegie system, students usually are taught and tested in groups, and units of credit are awarded on the basis of a letter grade. Teachers may administer some standardized tests, but they award final grades according to standards and performances (such as reports, essays, tests, projects, attendance) that they establish.

The most strident critics of this system describe the fixed periods of time as "arbitrary constraints" on the delivery of instruction and charge that "the standards used [for grading by teachers] are usually personal, subjective, variable, and vague" (Spady, 1978, p. 38). One need not accept this extreme judgment, however, to recognize that there are extreme differences between the time-based and the competency-based systems. In a competency-based system, a student's "passing" a course is not determined by his or her having spent a predetermined amount of time in a class and receiving a grade of C or above. Instead, a student must demonstrate that he or she has a <u>specified</u> competence, which may include both knowledge and

behavior. Another way to express the difference is to contrast the constants and the variables within the two systems. For example, suppose the same content is to be taught both by the time-based and the competency-based methods. The content, thus, is fixed in both. Beyond that, however, the constants and variables are exactly opposite. In the traditional system, time is fixed but student proficiency is variable. In the competency-based system, student proficiency is fixed but time is variable. As Blank (1984) explains,

> Essentially. . . in the more traditional approach, we usually hold learning time constant — 1-hour periods, 3-hour segments, 12-week quarters, etc. It follows then that if time is held constant, individual student proficiency must vary. If all 30 students in a class, for example, spend the same length of time on a unit. . . . and are then tested, some will do quite well, others not very well, and the rest about average. . . . If, on the other hand, we hold student proficiency constant (and at a high level) and let time be the variable (within reason) most students will be able to reach a high level of mastery in most any learning task. (p. 7).

There are many published definitions of competency-based education, but Bierly's (in Oliver, 1974), used by the state of Oregon, is clearly stated and contains all essential elements:

> [Competency-based education] is a cyclical process in which
>
> A. Competencies are identified and specified for a particular field of endeavor, then,
>
> B. Demonstrable criteria are established for each competency, along with specific levels which will be accepted as indicators that the competency has been mastered, then

C. Evaluation is made with each individual student of each competency to determine whether the student has mastered the specified competencies, then

D. Appropriate learning experiences are structured to enable the student to develop a mastery of these competencies in which the evaluation showed him lacking in mastery, and

E. Another evaluation is made subsequent to the learning experience to determine mastery of the competencies not previously mastered. (p. 3)

Bierly's definition of the entire process of competency-based education and Blank's description of the time-proficiency dichotomy should indicate that a change to a true competency-based system is not a matter of making minor changes in the traditional, Carnegie system. As Blank (1984) notes, competency-based education is "not a single method or technique. [It] is different because it involves the entire teaching-learning process" (p. 6). His comparison chart -- even though focused on vocational education -- is a good summation of the comprehensive differences between the two systems.

BASIC FOUR	CBVE	TRADITIONAL
WHAT Students Learn (Outcomes)	CBVE programs are based on precisely stated, occupationally verified competencies/tasks required by a successful worker on the job.	Traditional programs are usually based on instructional content taken from textbooks, course outlines, and other resources removed from the job itself.
HOW Students Learn (Instruction)	Students learn from carefully developed, high quality packaged and mediated learning materials supported by instructor interaction at appropriate points.	Most or all of the instruction is delivered by live instructor demonstrations and lectures.
WHEN Students Proceed from Task to Task (Pacing)	Typically, students continue working on each task until a high level of mastery is reached and only then move on to the next task.	Students usually proceed through the program as a large group spending predetermined time periods on each task. (50 minutes, 3 hours, 6 weeks, etc.).
HOW WELL Students Learn (Testing)	Each student must actually demonstrate ability to perform each task to a high level of proficiency before being considered competent.	Heavy reliance on paper and pencil testing and group testing. Marginal performance (C or D) may be acceptable.

Figure 1. Major differences between competency-based and traditional approaches to vocational education.

Source: From A Planning Model for Implementation of Districtwide Competency-Based Vocational Education by W. E. Blank, 1984, Tallahassee, FL: Florida Department of Education. Copyright 1984 by State of Florida. Reprinted by permission.

The reality in legislated educational reforms, however, is that they include only selected aspects of competency-based systems. When the recent education studies reported that many high school graduates lacked important

and necessary skills (the ability to follow printed instructions or balance a checkbook, for example), concerned citizens (and, consequently, lawmakers) began to voice the need to focus on outcomes, performance, and at least minimum competencies. The result has been the incorporation, in various ways, of specified competencies into the traditional instructional system. It is not possible to review here every state's action in this reform movement, but certain typical examples will serve to show the major trends at present.

Oregon's 1972 restructuring of its high school graduation requirements was one of the earliest reforms of this type (Oliver, 1974), occurring even before this decade's controversy made reform almost a political necessity. Oregon retained the traditional components of attendance and units of credit but added competencies, specifically "minimum survival competencies" that were to enable graduates to function in modern society (pp. 29-39). The competencies comprise three broad areas: personal development, social responsibility, and career development. (What are generally considered the "basic skills" of reading, writing, and computation are specified under the personal development category.)

Even though Oregon retains the concept of units for graduation (21 units, 130 hours each), these credits are earned in "areas of study" rather than in more narrow "subjects." A student needs three units in Communications, for example, rather than three in English, and while an area of study may be synonymous with a subject, it need not be. As Oliver explains,

> No longer will there be the need to place all students in the same English class, for instance, regardless of what their career or life goals are. If the districts provide the options, a student would have the opportunity to enroll in any number of courses or mini-courses to meet the new "Communications" requirement. . . . In any of the areas of study. . . , the student may have courses available. . . that meet his [or her] specific interests; whereas in the past, many required courses have been able to touch only lightly on a number of interests, and all too frequently were taught as college preparatory courses. (p. 33)

Moreover, the state allows a variety of options in the awarding of credit: work experience, independent study, college credit, and credit by examination.

The local district's responsibility is another important part of the Oregon plan, and it is twofold. First, each school district — within the broad outline of required minimum abilities set by the state — determines the specific competencies that it considers necessary for "survival" after high school and specifies the performance indicators that will measure the attainment of competency. Second, the district must prepare, for all credit courses, a planned course statement that lists the goals, content, and student outcomes in terms of skills, knowledge, and values (p. 2). Oliver (1974) reported that "school districts more readily accepted the new graduation requirements when all teachers in the school district were involved in writing course goals, performance indicators, and competency standards" (p. 55). Some districts even held workshops to elicit community involvement in defining the primary goals of education in the school district.

Thus the Oregon plan, from the outset, contained two important elements — in addition to the listing of competencies — that moved it closer to a comprehensive competency-based system: (1) school- and community-defined competencies and (2) immediate curriculum changes that reflected the competencies to be achieved.

More radical reforms are unlikely to occur in an entire state public school system, but they have been successful in some individual, state-accredited schools, and at least one example will be instructive. After a study by a committee of parents, students, and staff, the St. Paul (Minnesota) Open School decided to abandon completely the Carnegie system and require students to demonstrate competency in six broad areas: career awareness, community involvement and current issues, cultural awareness, consumer awareness, information finding, and personal/interpersonal skills and communication (Nathan & Jennings, 1979, p. 33). The system was entirely performance-based and not structured on the awarding of credits:

> Open School students had to gather statements from adults describing how and to what degree the students had demonstrated their competency. Each student assembled the statements or "validations" in booklets that ranged from 25-40 pages in length and made for fascinating reading. (p. 33)

Nathan and Jennings offer this example as proof that radical curriculum reform and graduation based on performance — not on standardized tests or "seat time" — can produce students who "have the skills necessary to survive and compete in American society" (p. 30). They point out that the St. Paul Open experiment won a Pacesetter Award from the U.S. Office of

Education as "a carefully evaluated, proven innovation worthy of national replication" (p. 33).

Nathan's and Jennings's argument leads to an important aspect of the move toward establishing minimum competencies: the question of how the attainment of those competencies is to be determined. If state leaders (and others) desire to set minimum competencies because they believe a letter-grade, credit-unit system does not ensure that students graduate with requisite skills, and if those leaders are not willing to adopt a radical approach to validating competencies (such as St. Paul Open's subjective testimony), how will students demonstrate that they have the required competencies? For 40 of the nation's 50 states, the answer is paper-and-pencil testing. (See Table 1.) Sometimes, as in the case of Oregon, this testing is only one means of certifying attainments of state-mandated skills, but more often it is the only means — particularly when the state wants to assess only a few skills.

It is not difficult to see why the minimum competency movement so often becomes a minimum competency <u>testing</u> movement. The media informs the public that many high school graduates do not have basic 3R skills; people are concerned (even angry) and demand that the schools do what they are supposed to do so that a diploma "means something"; legislators agree and promise that they will work to ensure that students do not graduate without basic skills; they propose that students — in addition to passing courses -- be required to demonstrate their skills; the legislature mandate statewide tests.

The experiences of North Carolina and Florida are typical. In the late seventies, both states felt pressure to demonstrate that graduates did indeed have sufficient reading and math skills to handle essential, practical life tacks such as balancing a checkbook, computing sales tax, or completing a job application. Minimum competency testing was legislated for several grade levels (see Table 1) and as a graduation requirement; then came the process of stating the competencies more exactly, setting standards for attainment, and designing the tests. In the meantime, particularly in Florida, there were several court challenges that delayed the process.

Because, as has already been discussed, competency-based education is a total system, the early (and continuing) concentration on a single facet, testing, can create significant problems. Gallagher and Ramsbottom (1978) reported that some North Carolina leaders recognized the dangers of beginning with tests and even voiced their concerns in the early stages of the minimum competency programs.

> The Competency Test Commission is concerned that the crucial part of this program will come after the tests. If the competency tests represent the leading edge of a constructive program that helps students with minimum competency skills, and provide the school with the motivation to strengthen their programs and standards, then it will have achieved the purpose which its authors foresaw. (p. 311)

Both Sunda (1978) and Donmoyer (1982) have warned that legislated minimum competencies and the tests for them are usually products of political initiative and negotiation. They may be developed under pressure from the media, not from educators; may have an unrealistic time frame that

Table 1. Minimum Competency Testing in the United States as of January, 1984

States Using Minimum Competency Testing	Government Level Setting Standards	Grade Levels Assessed	Expected Uses					First Graduating Class Assessed
			Grade Promotion	High School Graduation	Early Exit	Remediation	Other	
Alabama	State	3,6,9+		X		X		198[illegible]
Arizona[2]	State/local	8,12	(2)	X			X	197[illegible]
Arkansas	State	3,4,6,8		X				
California	State/local	4-11,10 yr. old+	X	X	X	X		1979
Colorado	Local	9,12		Local option				
Connecticut	State/local	3,5,7,8				X	X	
Delaware	State	11		X				198[illegible]
Florida	State/local	3,5,8,11	X	X	X			198[illegible]
Georgia	State	4,8,10+		X		X	X	198[illegible]
Hawaii[1]	State	9-12		X		X		198[illegible]
Idaho	State	9-12		Local option				198[illegible]
Illinois	Local	Local option					Local option	
Indiana	Local	3,6,8,10				X	X	
Kansas[3]	State	2-4,6,8,9,11,12					Local option	
Kentucky	State/local	3,5,7,8,10,11					X	
Louisiana	State	4,8,11	X	X			X	198[illegible]
Maine[4]	State	8,11					X	
Maryland	State	3,7,9,11	X	X		X		198[illegible]
Massachusetts	Local	Local option					X	
Michigan	State	4,7,10					Local option	
Missouri	State	8					X	
Nebraska	Local	5+					X	
Nevada	State	3,6,9,12		X		X		198[illegible]
New Hampshire	State	4,8,12					Local option	
New Jersey	State	9-12		X		X	X	198[illegible]
New Mexico	State	Local option, 10					X	198[illegible]
New York	State	3,6,8-12		X		X		197[illegible]
North Carolina	State	1-3,6,9,11		X				198[illegible]
Utah	Local	Local option					Local option	
Oklahoma	None	3,6,9,12					X	
Oregon	Local	Local option		X				197[illegible]
Rhode Island	State	4,8,10					X	
South Carolina	State	1-3,6,8,11				X	X	198[illegible]
Tennessee	State/local	4-6,8,11,12		X		X	X	198[illegible]
Texas	Not reported	3,5,9+				X		
Utah	Local	Local option		X				198[illegible]
Vermont	State	9-12		X			X	198[illegible]
Virginia	State/local	K-6,9-12		X				198[illegible]
Washington[5]	Local	4,8					Local option	
Wisconsin	Local	1-4,5-8,9-10		Local option		X		

[1] In Hawaii, students have three options: paper-pencil test, performance test; or course.
[2] 1983 legislation calls for Arizona to develop a minimum course of study and criteria for high school graduation standards and for grade-to-grade promotion criteria. Local school districts are to implement standards.
[3] Kansas test expired in 1983 -- the state legislature is expected to renew for a five-year period in 1984.
[4] The Maine legislature discontinued use of the test after one year.
[5] The Washington Department of Education discontinued use of this test in the late 197[illegible]'s.

NOTE: Some states have dates for first high school graduating class to be assessed with no expected use for high school graduation.

Source: From unpublished tabulations of the Education Commission of the States, compiled by Chris Pipho, 1984, Denver, CO. Used with permission.

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allows little research before implementation; and may be decided upon without the consultation of all significant groups, such as local school boards and community members. The tests may, in fact, be legislated without a clear understanding, shared by all parties, of their purpose, and this is perhaps the most telling issue in the nationwide rush to test for minimum competencies.

Spady (1978) has noted that those who want improvements in public education may see the competency testing in two different ways: as an accountability issue or as an effectiveness issue. The "accountability advocates" (p. 35) are most concerned that the tests force schools to be accountable for their products (students with diplomas). They expect the teachers to work harder and better if it is demonstrated that their students cannot pass the tests. Those who see effectiveness as the issue, the "reform advocates," have as their primary goal the use of competency testing to improve instruction. They see that an established minimum competency test without maximum competency learning is only part of the required effort for a competency-based system. The system must also have outcome goals and instructional experiences that reflect those goals. Spady maintains that if testing is mandated without parallel attention to other aspects of competency-based education, then the tests will only document "the poor articulation between the assessment and the instructional systems of the school" (p. 45).

There are some indications that the purpose of the tests is shifting toward the effectiveness side. Pipho (1983) reports that the test requirement as a condition of graduation is being deemphasized. The

emphasis has shifted to identifying subject areas in which a student may require remediation. While Florida and North Carolina have now denied students a regular high school diploma because they failed the state test, Kentucky and Maine both dropped their test requirements after one year. In all, Table 1 shows that of the 40 states having minimum competency testing, only 19 make the test a requirement for a diploma.

Yet the use of a test as a diagnostic tool to improve instruction is not without its dangers. Again the political impetus of the testing has a bearing. Few states go about the setting of competencies as Oregon did -- with extensive lists of many kinds of competencies and the required involvement of local school districts. Instead, most states focus on basic literacy and computational skills (Pipho, 1983). In this situation, if the teachers and administrators begin helping students pass the required test, they may narrow the focus of the curriculum to rudimentary skills. Sunda (1978) has written

> "Back to the basics" may be the positive way of saying that our school curricula are to be narrowed by this movement. The certification requirements will lead to concentration on the skills necessary for graduation. . . . Thus, the more complex skills taught in the schools may be deleted from the program of study. The program in a school district could be defined by a testing device that was constructed under the pressure of time and for which there is no adequate rationale. Letting the test define the school curriculum is possibly the worst effect the requirement could have on school practice. (p. 11)

Five years after Sunda's speculative article, the National Council of Teachers of English (NCTE) released a report that confirmed her fears (Pipho, 1983). The NCTE concluded that the tests, "originally intended to

measure the effectiveness of curriculums, are now a driving force in deciding what should be taught" (Pipho, p. 5). The Council also charged that educators' and state legislators' preoccupation with minimum competency testing "has contributed to the decline in the teaching and learning of critical written and analytic skills" (p. 5). Another related aspect of focusing on the most basic literacy and computation is that, as Sunda (1978) writes, "the focus of the school district is on the slow learner. . . . Once a standard for a skill has been adopted, the school has a moral responsibility to have all students reach that goal" (p. 12).

A further effect on students, and one of particular importance to vocational education, is that course and career options may be limited. If teacher time and school district money are increasingly devoted to remediation and "basic" courses, then students may not be able to choose in-depth study, either academic or vocational (Sunda, 1978, p. 13). The NCTE's assessment was that students were not acquiring the more advanced skills they need to compete for the more demanding jobs (Pipho, 1978, p. 5).

These adverse effects should not be seen, however, as an absolute indictment either of minimum competency requirements or testing. They are, rather, evidence of the difficulties that result when an urgent political demand for competency testing is the impetus for the development of statewide competencies. If the competency tests are to be used as tools to improve instruction (as is the intent of the many states who use tests only as "early warnings" [Pipho, 1978, p. 2]), then the determination of competencies (skills and knowledge) must be a careful, necessarily

time-consuming, joint effort of local and state educators and citizens. California is one state that, within a competency testing program that includes both periodic assessment and passage before graduation, delegated the responsibility for standard setting to local school districts. Gary K. Hart (1978), the former teacher who introduced the bill setting up the state's minimum competency program (Assembly Bill 3408), has written that

> Although there are certain advantages to a statewide standard (it insures consistency and allows for ready comparisons among districts), . . . we wanted to give local teachers, parents, administrators, and students some "ownership" of the standard-setting process. . . . A.B. 3408 encourages local school communities to reevaluate educational goals, review curricula, and improve instructional strategies to support basic skills training. (p. 593)

Moreover, Hart maintains that the focus on basic skills is merely a necessary first step; he recognizes that complex skills (abstract or technical) can be taught within a competency-based system:

> We have warned educators against a "back-to-basics mentality." Instruction in the basic skills need not be implemented at the expense of flexibility, or creativity, or of innovation. Basic skills instruction is, of course, only one part of schooling. California schools should continue to offer broad experience in the fine arts, humanities, and sciences.
>
> In fact, basic skills are most effectively taught when integrated throughout the curriculum. . . . Proficiency legislation should not cause our school districts to collapse the curriculum or abandon creative approaches to learning. (p. 593)

Because, however, Hart and others felt that many districts did not have extensive experience with competency-based instruction, the bill specified only three areas of proficiency: reading, writing, and mathematics. Hart's position was that "Once necessary changes in the

curriculum and in counseling efforts are made, additional or more difficult competencies can be identified at the option of the district" (p. 593).

The NCTE and critics such as Sunda would probably question the wisdom of leaving such an important task optional. It may be that, given the necessity in our country to work through the legislative process, the beginnings of educational reform are destined to have false or shaky starts. But once the desire for competency-based education has been established — even if the desire manifests itself in testing and in an emphasis on fundamental skills — it is possible to work toward a comprehensive system in which, as in Oregon, competencies are defined in many areas and instruction is tied to the competencies.

In 1983, for example, Florida took a step toward strengthening the competency movement that the state began with testing. In its comprehensive educational reform legislation, the RAISE bill (an acronym for Raise Achievement in Secondary Education), district boards were required to set "performance standards for each academic program in grades 9 through 12 for which credit toward high school graduation is awarded" (Florida, 1983a). The boards are also to establish policies concerning mastery of the standards. The bill stipulated that districts must incorporate the performance standards into the pupil progression plan by July 1, 1985, in order to receive funding.

For true competency-based education, such additional reforms are necessary. Oliver's (1974, p. 59) summation of the major policy shifts in Oregon stands as a reminder of how far most states have yet to go in their

reforms, and of the possibility of doing so. He wrote that Oregon moved from:

- traditional college-bound and academic-based
- textbook-centered
- teaching-based programs

to:

- learner-based
- performance-based
- competency-based
- experience-based
- community-based programs.

Thus far the emphasis in most states on basic skills may severely curtail vocational, and other, programs if money and teachers' time are increasingly directed toward instruction in these skills. In such a case, students may be denied options. In another case of legislative reform -- increased graduation course requirements -- vocational programs may suffer, but for a different reason: students may themselves not choose the vocational option. Again, legislative action has the potential to dictate curriculum change.

Course Requirements

In response to charges that the American high schools have failed, state legislators have done more than demand proof of final performance. They are also beginning to increase the numbers of courses students must take, again with an emphasis on the traditional, "foundation" curriculum of

language and mathematics, with science as a third major area. While the goal of this reform is not minimum achievement but more rigorous standards, such legislation still reflects the stance that improvement of the schools should be approached through basic studies -- essentially the historical liberal arts subjects. (The Education Commission of the States [ECS] reports that only five states establishing computer literacy as a graduation requirement have passed legislation [1982], even though the importance of computer literacy is increasingly recognized.)

Surveys by the ECS (see Table 2) and Savoye (1983) revealed that 16 states have increased graduation requirements since 1982 and 15 more expect or are studying changes in their requirements. Florida is a typical example of a state that has responded to the educational "crisis" by increasing the required credits in English, math, and science. The 1983 RAISE bill mandated a progressive increase until the 1986-87 graduating class reaches the full 24-credit requirement, including 4 credits in English, 3 in mathematics, and 3 in science.

Table 2 shows that vocational teachers -- even if they support the strengthening of academic requirements -- have reason to be concerned that such requirements will adversely affect their courses. Only nine states -- Florida among them -- have a vocational or career education requirement, and in some states that requirement permits a choice between a vocational or a fine arts course. Students must use electives to take vocational courses, but when academic requirements increase, elective hours must decrease, and students who want a vocational track may not be able to take sufficient courses to achieve entry-level competency. (Other course

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Table 2. High School Graduation Course Requirements in the 50 States

(Numbers Refer to Years of Instruction)

State	Language Arts	Social Studies	Mathematics	Science	PE/Health	Electives	Other	Total	Grade Span	Notes
Alabama	4	3	2	1	1½	6½		20	9-12	Effective for 9th grade in fall of 1982
Alaska	1	1	1	1	1			19	9-12	Local boards determine electives and other
Arizona	4	2	2	2		9½	½—examination of the free enterprise system	20	9-12	
Arkansas	4	1			1		10	16	9-12	Changes anticipated in 1984
California	3	3	2	2	2		1—fine arts or foreign language	13	9-12	Districts compare their offerings with a state model; usually exceed 13 units
Colorado										Local boards determine requirements. Colorado has constitutional prohibition against state requirement
Connecticut								18	9-12	Local districts determine the composition of the 18 required units. The state requires districts to offer 11 subject areas. The state board is currently reviewing proposals for specific subject requirements with a total of 21 units
Delaware	4	3	2	2	1½	6½		19	9-12	Requirements effective for the graduating class of 1987
District of Columbia										
Comprehensive	4	2	2	2	1½	8	½—foreign language	20½	9-12	Electives must include life skills seminar
Career-vocational	4	2	2	2	1½	11½	1—foreign language 9—specialized preparation	23	9-12	Electives must include life skills seminar
Florida	4	3	3	3	1	9	½—practical arts ½—fine arts	24	9-12	Will increase with requirements: years after 24 units are reached for graduating class of 1986-87
Georgia	4	3	2	2	1	8	1—fine arts, vocational education or computer technology	21	9-12	
Hawaii	4	4	2	2	1½	6	½—guidance	20	9-12	
Idaho	4	3	2	2½	1½	6	1—reading specialist 1—humanities	20	9-12	Requirements effective for graduating class of 1988. Will increase thereafter
Illinois	3	2	2	2	1	4	½—consumer education	16	9-12	Requirements differ in 3- and 4-year high schools. Local districts determine remaining units and may exceed the 16 unit. Effective 1984-85
Indiana	4	2	2	2	1½	7		19½	9-12	Requirements effective for graduating class of 1988
Iowa		5½			1				9-12	Local boards determine additional requirements
Kansas	4	3	2	2	1	6		20	9-12	These requirements effective for the 1986 graduating class
Kentucky	3	2	3	3	1	8		20	9-12	Requirements effective for the graduating class of 1988-87
Louisiana	4	3	3	2	2	8½	½—free enterprise system	22	9-12	
Maine	4	3								American history required. Local boards determine other requirements
Maryland	4	3	2	2	1	8		20	9-12	New requirements have been recommended
Massachusetts		1			4					American history required. Local boards determine additional requirements. The possibility of more state regulation is being studied
Michigan		5½								Local boards determine additional requirements. New graduation requirements are being studied
Minnesota	3	2			1			15	10-12	Local boards determine remainder of units
Mississippi	3	2½	1	1		9½		19	9-12	
Missouri	3	3	3	3	3	11	2—English, social studies, math or science. 1—practical arts, 1—fine arts	20	9-12	20 units must be cooperatively planned by student, parents and the school to meet individual needs of the student. Requirements will be updated in 1984

(table continues)

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State	Language Arts	Social Studies	Mathematics	Science	PE/ Health	Electives	Other	Total	Grade Span	Notes
Montana	4	2	2	2	1	2	1—fine arts 2—practical arts	16	9-12	The superintendent has recommended raising total to 19
Nebraska									9-12	180 semester hours required. Local boards determine specific subject area requirements. Requirements currently under study
Nevada	3	2	2	1	2½	9½		20	9-12	Requirements effective for graduating class of 1985
New Hampshire	4	2	1	1		8		16	9-12	New graduation requirements have been proposed
New Jersey	4	2	2	1	4		1—fine, practical or performing arts; ½—career exploration	14½	9-12	U.S. history is required
New Mexico	4	2	2	2	1	9	1—practical or fine arts	21	9-12	Requirements effective for graduating class of 1986-87. Local boards specify course titles for required subjects
New York										
Local diploma	4	3	1	1	½	6½		16	9-12	The Board of Regents has recommended new requirements
Regents diploma	4	3	1	1	1	8½		18	9-12	
North Carolina	4	3	2	2	1	9		20	9-12	
North Dakota	4	3	2	2	1	7		19	9-12	These requirements are effective for graduating class of 1986-87
Ohio	3	2	2	1	1	9		18	9-12	
Oklahoma	4	2	2	2		10		20	9-12	
Oregon	3	3½	1	1	2	9	½—career driving; 1—fine arts or foreign language	21	9-12	The state board of education is considering major revisions in 1984
Pennsylvania	3	2	1	1				13	10-12	Local board determines remaining requirements. Proposed regulations would raise the total to 21 units for grades 9-12
Rhode Island										
General	4	3	1	1		7		16	9-12	In the future computer requirements for all students will be placed in College bound
College bound	4	2	2	2		4	2—foreign language; ½—computer literacy	16	9-12	requirement effective for entering 9th form in 1986-87
South Carolina	4	3	3	2	1	7		20	9-12	Requirements effective for graduating class of 1987
South Dakota	4	2	2	2		8		18	9-12	The state board is currently considering revisions in the requirements
Tennessee	4	1½	2	2	1½	9		20	9-12	Requirements effective for the graduating class of 1987
Texas	3	2½	2	2	2	6½		18	9-12	A major revision of the curriculum is expected in 1984
Utah	3	2	1	1	1½	6½		15	10-12	New requirements for grades 9-12 with 24 units being proposed
Vermont										Local boards determine requirements. However new state requirements will be adopted in 1984
Virginia	4	3	2	2	2	6	1—additional science or math	20	9-12	Requirements effective for entering freshmen in 1984-85
Washington	9	7½	6	6		16½	3—occupational education	49	9-12	Requirements effective for entering freshmen in 1985-86. NOTE: each unit equals 60 hours of instruction. Therefore 3 units equal approximately 1 year
West Virginia	4	3	2	1	2	8		20	9-12	Requirements effective for the graduating class of 1987
Wisconsin										Local boards determine requirements
Wyoming		3						19	9-12 or 10-12	Local boards determine remaining requirements

Source: From State Education Leader, Winter 1984, Denver, CO: Education Commission of the States (ECS). Copyright 1984 by ECS. Reprinted by permission.

options for students will decrease as well, including art, music, band, and even athletics.) Particularly in the first few years of the new requirements, students may feel an urgency to meet the academic requirements and thus may avoid job-preparatory electives. If vocational enrollments decline, state funding for the programs will decrease. Some states have already experienced these declines. Lee Travis (personal communication, March 1984), Chief, Bureau of Technology, Trade and Agricultural Programs with the New York State Department of Education, reports that fewer New York students are enrolling in vocational classes, and he feels that new academic requirements are substantially responsible.

The point is not that teachers may lose their jobs or that vocational programs may lose their standing in the secondary schools, but that some students — indeed, many students — will not be able to receive the kind of high school education that will most benefit them. As Seeley (1984) argues, directing all students into what is essentially a college preparatory program is not necessarily the only, or best, way to make them better educated:

> Whatever else standards might mean, they must at least mean that all of our citizens will become literate and have enough of the tools of learning and a sufficient background in the arts and sciences to be able to continue learning through life. This is what we must mean if the call for all students to take "four years of English, three years of mathematics, three years of science," and so on is to be anything other than a sham. (p. 334)

A college preparatory program is only one approach to a solid educational foundation. Political reforms such as RAISE, while admirable in intent, may simply be too hasty because they do not provide alternatives

or are implemented so quickly that school counselors are not prepared to help students create alternatives. The increased graduation requirements throughout the country are such new reforms that data are not yet available on their effects, but vocational educators in Florida and elsewhere are already moving to work within the requirements to ensure that students are not deprived of programs that will prepare them for the world of work.

First, at the district level, vocational educators in Florida have developed sample schedules that demonstrate how students may accommodate all the new requirements and take some vocational courses as well. Appendix A shows the schedule developed by the Broward County School district. Such guidance may help prevent an initial exodus of students from vocational programs.

A second district initiative involves course substitution. Appendix B details the plan of Palm Beach County, in which specified vocational job preparatory courses may substitute for one credit each in English, math, or science. It is extremely important that state leaders recognize that students may achieve academic competencies within vocational courses. Thus vocational educators within Florida's Division of Vocational Education (DVE) are recommending that the legislature direct all school districts to develop standards, as has Palm Beach County, to allow graduation credit for comparable competencies in English, math, and science that are taught in vocational courses. Division staff have proposed a new statute (DVE, 1984) that will begin this process:

General Requirement for High School Graduation

> The Department [of Education] shall develop and implement a process through which the competencies acquired in vocational and academic courses may be compared. Students who successfully complete vocational programs in which the competencies are comparable to the competencies acquired in academic courses may be exempt from the requirement of course completion for those specific courses. Such students must replace those academic credits with other courses within the discipline.

Clearly, an unsettled issue underlying the movement to improve secondary education is the nature of the education that students need in today's world. On one hand, critics charge that graduates lack the basic intellectual tools of reading, communicating (writing), and analyzing (for example, as taught through mathematics and science). A tougher, and traditional, college preparatory curriculum is legislated.

On the other hand, the same critics warn that American public education is increasingly out of step with the needs of our society for a work force highly adaptable to the radically changing technological environment. Computer literacy begins to be legislated as a basic skill.

Just what are the basics in 1984, with the 21st century fast approaching and more technological changes assuredly coming? If the schools should be more attentive to our nation's work-force needs, just what are the skills that business and industry need but are not getting? Will the traditional curriculum suffice, can it be accommodated to our economic and technical needs, or must it be totally transformed?

No one has these answers because we are in the thick of change and reassessment. We are in a period of defining educational goals, and there is by no means consensus about the definition; there is only consensus about the need for change. What is good is that a dialogue has begun among many groups: educators, local citizens, business people, and legislators. What is dangerous is that action may be taken before all the issues — and options -- are understood. The final section of this paper explores the views of the business community on some educational issues of the eighties.

BUSINESS, INDUSTRY, AND THE BASICS

The participation of the business world in public education is not new, but the intensity of the participation has fluctuated. Especially strong, for example, through the world wars and the fifties, the involvement of business in secondary education declined in the sixties and seventies. While a business influence was certainly not absent (through community leaders on advisory boards and through cooperative training programs), the theme of partnership that educators are pressing in the eighties would have been quite foreign during the past two decades. Now, in Michael Timpane's (1984) phrase, "business has rediscovered the public schools" (p. 1). And, as he points out, it would be difficult to find an educational study commission, task force, or council which does not include, prominently, business and industry representatives.

The resurgence of involvement is certainly not surprising, for one impetus for the recent scrutiny of public education is the recognition that the nation's labor needs are changing more rapidly than ever before. Not only are new occupations being created, but long-standing occupations now require different skills. The microcomputer communications revolution, for example, has touched nearly every part of Americans' lives.

Thus Savoye (1983) reports that companies and corporations, large and small, are realizing that they have more than passing interest in what the public schools are doing. The students who are products of our educational system must be the workers of tomorrow's high tech economy. Technological development has been so rapid in the last few years that even business

people themselves have difficulty keeping pace, and they now realize that the public schools may be falling far behind.

Timpane (1984) also notes that the projected labor supply has spurred industry's interest in education. Quite simply, industry will not have the plentiful labor pool it has enjoyed in the past. Due to a declining high school-age population, there will be 20 percent fewer high school graduates in 1990 than in 1980, (Timpane, 1984), and the recent rapid increase in the proportion of women in the work force will slow down. At the same time, in order to compete in the world economy, American companies will need workers who are highly productive and capable of adapting to technological change.

Thus business and industry are increasingly involved in education, both in policy making and in cooperative programs with the schools. Thomas A. Vanderslice, president of GTE (General Telephone and Electronics) Corporation, explains that GTE's assistance in improving North Carolina's secondary math and science instruction can be seen as pure "selfishness" as much as philanthropy:

> If we can't find the technical types we need to grow, then we and the rest of our industry are in trouble. We're trying to find every innovative way we can to at least do our part. (Savoye, 1983, p. B-5)

Not all business and industry employers feel, however, that what they need from the public schools are "technical types." In the eighties, two apparently contradictory factions have emerged, factions that relate directly to the debates over minimum competencies and increased graduation requirements. Crohn's 1983 Technological Literacy in the Workplace is one study that delineates the two approaches to educating for a high technology

future. Both groups within business and industry support the strengthening of basic reading, writing, and computational skills, but they disagree on the major thrust of the curricula. One group within business and industry feels the answer is an increased emphasis on vocational education, career education, and microcomputers, in addition to basic skills. The second group considers a general knowledge base and higher-order intellectual skills as taught through a strengthened liberal arts curriculum to be the best approach.

As an example of the first viewpoint, Crohn reports that data gathered by the National Assessment of Educational Progress (NAEP) led researchers to conclude that we are raising "a new generation of Americans that is scientifically and technologically illiterate" (p. 14). Many agree, and further argue that, in such a world, technicians are crucial. Gene Bottoms (1983), executive director of the American Vocational Association, has written that

> the extent to which we can utilize high technology and translate it into better products and increased productivity depends upon the availability of people who can apply it, maintain it, and service it. These people are not the scientists and the mathematicians -- they are the advanced-level skilled workers. (p. 8)

Bottoms also cites the corroborating opinion of Donald N. Frey, chief executive officer of Bell and Howell Company, that state-of-the-art technology cannot be translated into improved production capacity without advanced-level technical workers.

From his survey of the research on technological literacy, Crohn (1983) compiled a list of those skills necessary for employability in

tomorrow's labor force. Written as possible job descriptors, the skills make clear why many business and industry leaders support more technical training:

- Demonstrate competence including precision and accuracy with computer, basic electronics, other peripheral equipment
- Prepare and enter information input for computer and other hardware; understand what is necessary for a computer to accept new information or respond to a request
- Maintain and manipulate files of technical information and perform other systems operations
- Demonstrate competence with analog devices such as potentiometer
- Demonstrate competence in networking, data accessing
- Develop and evaluate software
- Monitor work flow of production systems. (p 15)

The alternate business viewpoint, however, says that specific technical skills will quickly change and even become obsolete; students are better served, and more useful to employers, if they have acquired the intellectual skills that allow them to adapt their knowledge and continue learning throughout their work life.

Peter Elliman (1983), vice-president and general manager of Lucas Industries, is a strong advocate of this position. He explains, for example, that his company purchases state-of-the art laser guns that even postsecondary vocational schools are unlikely to own. He writes, "I would much prefer that the schools concentrate on teaching their students the basic, transferable vocational skills that they will need when I teach them the applied technology I utilize" (p. 4). And when Elliman describes the

type of worker he is looking for, one sees that his idea of "vocational skills" is broad. He wants workers who can read and write; have common sense; understand his industry; realize that employers expect hard work; do not expect to advance immediately; and work well with others.

Timpane (1984) reiterates this corporate view that students must acquire a general knowledge base rather than skills and knowledge specific to an industry. He contends that business and industry need employees who can read, write, and count; employees must be able to solve problems, learn new things, and interact with others (p. 390).

The College Board (1983) surveyed business and industry leaders and found that they desired students to possess the "basic academic competencies," which are broad intellectual skills that "provide a link across the disciplines of knowledge although they are not specific to any particular discipline" (p. 70). These competencies encompass reading, writing, speaking and listening, mathematics, reasoning, and studying. Such skills enable people to adapt to new knowledge and situations, and Crohn (1983) says this is crucial because "Future workers will face complex problems. To perform successfully in the marketplace, most workers will need to be resilient, versatile, independent and able to interact cooperatively and ethically with others. . . . Adaptability seems to be the one essential ingredient in successfully coping with a rapidly changing technological environment" (p. 28). In Crohn's survey, the business people who emphasized basic, rather than job-specific, skills wanted schools to teach students decision-making skills and to help students understand adult responsibility.

This business and industry perspective thus emphasizes what are often called the higher-order intellectual skills: analyzing and synthesizing information in order to solve problems. Russell W. Rumberger (1984), a senior research associate with the Institute for Research on Educational Finance and Governance at Stanford University, says that an education providing these skills is best both for skilled and unskilled workers because it equips them to meet change — whether technical, political, social, or cultural. And for specifically technical jobs, Crohn (1983) maintains that workers will need, beyond an understanding of technology, the powers of clear and logical thinking that math and science study provide. He says, "to adequately prepare young people for such advanced level technical occupations, educational policy makers need to seriously examine applied math and science components in educational institutions" (p. 18). This is the same point that Elliman (1983) makes when he urges school officials to send math and science teachers on sabbaticals into industry every five to seven years.

Elliman's suggestion indicates that the two "factions" within the business and industry community may not be as thoroughly opposed in their views as Crohn and others have presented them. The advocates of the rigorous liberal arts curriculum (more math, science, and language study) may not really be in conflict with the advocates of the technical curriculum (more vocational education, career education, basic skills, and computer instruction). Their positions may be, as was previously indicated, only apparently contradictory.

As one examines the arguments of the liberal arts advocates, it appears that the result they desire from such study is a closer relationship between what students learn and what will be required of them in the world of work. They want, for example, graduates who are adaptable, positive in outlook, able to communicate and work well with other people, and realistic about what is expected of them as adults. These are qualities which are also stressed — and taught — in career and vocational education programs. Similarly, statements of the need for increased coursework in math, science, and critical reading and thinking always emphasize the application of such knowledge to modern life and work. After all, the liberal arts curriculum has always included the higher-order intellectual skills; they are not "new basics" for a technological age (Crohn, 1983). What is really new is that employers want more collaboration with the public schools: they want teachers to know exactly what their companies do so that the curriculum can help prepare students for the actual demands of work.

Some examples of the ways that business and industry are working with public schools will illustrate that their efforts in educational reform are not a question of whether "math, science, and language courses" are superior to "technical, job preparatory courses": their efforts show that math, science, and language must not be taught without reference to the increasingly complex society in which we live. Business and industry need knowledgeable graduates from the public schools, but the public schools also need the front-line knowledge that business and industry so often have. For example:

- GTE is providing $2,500 grants for math and science teachers to pursue graduate studies; after graduation, the school districts will provide $2,500 for the teacher to design new projects for the classroom;

- Atlantic Richfield Company is giving employees time off to teach mathematics and other subjects in inner-city Los Angeles schools;

- Xerox Corporation is sending volunteer employees who are scientists and engineers into schools in Tampa, Florida, and Rochester, New York twice a week to provide direct experience in physical science and mathematics;

- Chase-Manhattan Bank has instituted a two-year training program in curriculum leadership for high school principals in New York City; minigrants are also awarded to teachers for classroom improvement projects;

- Kaiser Aluminum and Chemical Company provides employees with release time to teach math and science in the Oakland, California, school system;

- Phillips Petroleum Company spent $7 million developing "Search for Solutions," a film series and related text intended to augment science teaching at the secondary level. (Savoye, 1983, p. B-5)

General Electric Company's (1982) Educators-In-Industry-Program (EIIP) is an example of an industry-schools collaboration in the career education area. In one component of the EIIP, secondary teachers go into General Electric plants to learn about industrial careers firsthand; the program is held under the auspices of local colleges or universities and tailored to the employment needs and resources of the local community. What this does for the participating high school teachers -- and teachers of every subject can participate — is to help them help their students relate high school coursework to possible careers.

Thus it may be that pitting basic skills against vocational programs is not even the proper way to conceptualize the issues facing contemporary education. Clearly, when business and industry leaders say they want

"basic, liberal arts studies," they mean something broader, something that includes specialized knowledge as well as employability skills. And if legislators -- who mandate competency-based education and increased liberal arts graduation requirements -- do not also begin to think in these broader terms, the public schools will not be any closer to remedying the discrepancy between what students are taught and what students need to know.

If there is one thing that the technological age should be teaching us, it is that all systems interact. Isolationism and factionalism are simply not the way of the world. In order to produce well-educated citizens who can read, write, think, and act within the America of the future — who have, in other words, attained technological literacy as a component of a broad-based general curriculum -- all aspects of secondary education must work together to provide as many options as possible for students. Even the college-prep student who intends to be a professor of medieval philosophy must have the technical understandings to cope in American society, not to mention the understandings of word processing and other computerized technologies that will aid in scholarly research and writing. Even the vocational student who wants to be an automobile mechanic must be able to read and apply complex information and must be able to apply inductive reasoning when diagnosing mechanical problems. It is possible to give both these students fundamental, life-long competencies in analytical and communication skills as well as in technical skills within programs that best suit their career goals.

Surely what the future holds for secondary vocational education is a closer relationship with academic education. Teachers in both areas must work together to show those who legislate educational reforms that secondary education is not an either-or, single-track battle between liberal arts and practical studies. They must work together to show legislators that competency-based education is a complete system that must include program development as well as student evaluation, and that must never allow minimum competencies to become maximum standards. They must work together to show legislators that students who so desire can learn academic skills in vocational courses. And they must work together, with business and industry, to ensure that increased graduation requirements, or a "return to the basics," are designed so that students are better prepared, not less prepared, to enter our high tech future.

FINDINGS

This paper was intended as an exploration of the issues involved in two types of legislative reforms within secondary education: minimum competencies and increased course requirements for graduation. The consequences for vocational education in particular were considered, and thus the perspectives of business and industry leaders on these reforms were discussed. The paper did not attempt a complete survey of each state's actions, nor a definitive judgment of the quality of any state's reform. Examples from individual states were cited when they were pertinent to the discussion, but in the following summary of the paper's main points, these examples are omitted. For the reader's convenience, the paper's main headings and subheadings are repeated.

STATE LEGISLATION AFFECTING SECONDARY EDUCATION

1. Within the last five years, particularly in response to reports of the decline of high school student's basic skills, all 50 states have passed some type of legislation intended to improve secondary education.

2. Two possibly far-reaching reforms that many states have mandated are minimum competencies and more stringent course requirements for graduation.

Minimum Competency Requirements

3. Competency-based education is not a single technique but a complete teaching-learning system in which competencies are identified for a particular endeavor, demonstrable criteria and levels of mastery are

established, instruction is designed so that students may attain the competencies, students are evaluated for mastery of the competencies, and the process is repeated -- with appropriate modification of instruction -- until the student demonstrates mastery.

4. Most legislated educational reforms, however, initially include only selected aspects of competency-based systems, primarily the specification of and testing for minimum competencies in reading and mathematics.

5. The minimum competency movement often becomes a testing movement because testing is the most immediate way for legislators to satisfy the public. Some dangers in legislated competencies and tests are that they may be developed under pressure from the media, not from educators; may be implemented too quickly for sufficient development; and may be decided upon without the consultation of all significant groups.

6. A particular danger in competency testing is that those advocating testing may have two different understandings of its purpose. "Accountability advocates" want the tests to force schools to be accountable for their products (graduates), to force schools to work harder if the tests show they have "failed." "Reform advocates" want the tests to be used to make education more effective. They do not believe testing should be mandated without parallel attention to other aspects of competency-based education: outcome goals and instruction.

7. There is evidence that the use of tests is shifting toward the effectiveness side (only 19 of 40 states using testing require passage for

graduation), but using a test as a diagnostic tool for improving instruction also has dangers.

8. Because more state tests focus on basic language and computational skills, they may affect instruction by narrowing the curriculum, forcing schools to focus on slow learners, and reducing students' options for in-depth study, either vocational or academic.

9. These adverse effects are not necessarily indictments of the minimum competency movement, but they indicate the difficulties that arise when an urgent political demand is the impetus for reform. If competency tests are to be tools to improve instruction, then local and state educators and citizens must work together to establish comprehensive competencies, as well as instruction that is appropriate for their attainment.

Course Requirements

10. Since 1982, 16 states have increased graduation requirements and 15 more expect to or are studying such changes. Most states are increasing the traditional liberal arts requirements of English, mathematics, and science.

11. Students may be denied a vocational track because they have fewer electives, or, particularly in the first years of the new requirements, students may not choose vocational electives because they fear they won't have sufficient academic credits.

12. A college preparatory program is not the only means for students to achieve a solid educational foundation, and many political reforms,

while admirable in intent, may be too hasty because they do not provide alternatives or are implemented so quickly that counselors cannot advise students about alternatives.

13. Vocational educators can preserve the vocational option within increased graduation requirements by (a) developing sample schedules that show students how to accommodate both new requirements and vocational courses, and (b) developing plans — and seeking legislation to implement them — to allow vocational courses to substitute for academic requirements.

14. Both the minimum competency and course requirement reforms really involve the issue of what constitutes a proper education for today's highly complex, technological world. Thus the perspective of business and industry on educational reform is important.

BUSINESS, INDUSTRY, AND THE BASICS

15. Within business and industry, two apparently contradictory factions have emerged. One group wants an increased emphasis on vocational education, career education, basic skills, and the use of microcomputers. The second group considers a general knowledge base and higher order intellectual skills as taught through a strengthened liberal arts curriculum to be the best approach.

16. The supporters of more technological literacy maintain that the specific skills required for employment in tomorrow's work force are highly technical and are not being taught through traditional math, science, and language arts courses.

17. The opposing side maintains that technical skills become obsolete so rapidly that students are better served with a liberal arts curriculum that develops the higher-order intellectual skills needed for life-long learning, problem solving, and adaptability to change.

18. The two factions may not be as thoroughly in conflict as they appear, because the liberal arts advocates always emphasize the application of such study to modern work and the importance of teaching personal responsibility. Pitting liberal arts curricula against vocational programs may not be the proper way to conceptualize the issues facing contemporary education, for when business and industry leaders say they want basic, liberal arts studies, they mean something broader, something that includes specialized knowledge as well as employability skills.

19. If the goal of secondary education is the attainment of technological literacy as a component of a broad-based general curriculum, the vocational and academic educators must work together. They must, with business and community leaders, convince legislators that students need more options, not fewer, and that both vocational and college preparatory students can attain fundamental, life-long competencies in analytical and computational skills as well as in technical skills within programs that best suit their career goals.

APPENDIX A

Sample Schedules, Broward County Schools, Fort Lauderdale, Florida

Generally recommended by counselors in 1981-82

Period	Grade 9	Grade 10	Grade 11	Grade 12
1	English	English	English	English
2	Math	Math	Math	Elective
3	Science	Science	Science	Elective
4	Social Studies	Health/Elective	American History	Elective
5	Physical Education	Physical Education	Elective	Elective
6	Elective	Elective	Elective	Elective

Proposed by Vocational, Technical, and Adult Education Department in 1982-83

Period	Grade 9	Grade 10	Grade 11	Grade12
1	English	English	English	English
2	Math	Math	Math	Math
3	Science	Science	Science	Social Studies
4	Physical Education	Physical Education	American History	Health/Elective
5	Elective	Elective	Elective	Elective
6	Elective	Elective	Elective	Elective

"Cake-and-eat-it-too" schedule, revised for RAISE requirements in 1983-84

Period	Grade 9	Grade 10	Grade 11	Grade 12
1	English	English	English	English
2	Math	Math	Math	Math
3	Science	Science	Science	Science
4	Physical Education or Health (LMS*)	Social Studies	American History	Social Studies
5	Foreign Language	Foreign Language	Vocational Elective	Vocational Elective
6	Vocational Elective	Fine Arts/Practical Arts	Vocational Elective	Vocational Elective

*Life Management Skills, encompassing nutrition, drug education, cardiopulmonary resuscitation, and hazards of smoking

APPENDIX B

High School Course Substitution Credit, Palm Beach County Schools, West Palm Beach, Florida

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A student in grades 9 through 12 who enrolls in and completes a vocational job preparatory program may substitute credit for a portion of the required four credits in English, three credits in mathematics, and three credits in science. No more than one (1) credit may be substituted in each area. Substitutions will be for the last required credits. Credit substitution is not applicable to the DCT (Diversified Cooperative Training) Program.

Vocational Job Preparatory Program Substitution

English:

7600 - Secretarial Occupations
7660 - Clerical Occupations
7650 - Business Administration Occupations

Mathematics:

7640 - Accounting Occupations
7660 - Data Processing Occupations

Science:

3040 - Health Service Aide
3020 - Medical Laboratory Assisting
3610 - Livestock Production
3665 - Nursery Occupations
3606 - Crop Production
3605 - Citrus Production
3684 - Woodland Operations

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HIGH TECHNOLOGY EDUCATION: A PROGRAM OF WORK

The following publications have been developed by the Office for Research in High Technology Education for the U.S. Department of Education's Office of Vocational and Adult Education:

At Home in the Office:

- At Home in the Office: A Guide for the Home Worker

COMTASK:

- Procedures for Conducting a Job Analysis: A Manual for the COMTASK Database
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- The Changing Business Environment: Implications for Vocational Curricula
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